a small globular, shiny mud pellet. The wasp then takes this pellet with its mandibles and forelegs to a previously selected place to build a small pot like cell with a small funnel like mouth. The female wasp inserts the abdomen tip into the mouth and deposits an egg inside the cell. Then the wasp goes foraging to provide paralyzed caterpillars as food for the hatching young wasp grub.

The Rhipiphorid beetles lay their eggs in the surrounding vegetation. The eggs on hatching into triungulin larvae want to catch hold of the leg of wasps coming in their way during foraging. The triungulin larva attaches itself to the wasp leg and reaches the mud cell. It passes into a period of waiting stage about 8 to 12 days inside the cell. During this period the wasp egg hatches and becomes a fleshy lemon yellow grub in about 8 to 10 days, forming a thin white membrane lining the cell wall as a whole. The minute triungulin Rhipiphorid larva at this stage loses its legs and penetrates the wasp grub, feeds as an endoparasitoid for 3 to 4 days. Then it is ectoparasitoid for about 20 days, holding the anterior part of the head of the wasp grub like a collar (Fig. A and Fig. B). Throughout the grub stage, the parasitoid beetle grub secretes a digestive enzyme which it ejects at the point of contact with the eumenid grub, keeping it from decay for about 18-20 days. Within this period the Rhipiphorid grub completes its feeding and starts pupating within the same cell (Fig. C). The pupal stages (Fig. D & E) lasts between 7 to 9 days and then slowly changes to the characteristic fully grown red and black coloured adult in a period of 38 to 42 days (Fig. F).

One interesting fact as far as the mud cell is concerned is that the parasitoid Rhipiphorid beetle, after the completion of its complicated life cycle, cannot escape out of the cell because it cannot gnaw out of the hard mud cell due to the second layer of mud coated by the female wasp brought from the termitarium. The beetle escapes if the mud cell is broken accidentally, otherwise it gets trapped and dies inside the mud cell. In case of paper wasps, sand wasps and bees, the young Rhipiphorid beetles can emerge because their nests are open in nature hence they survive. This is the first record of a Rhipiphorid parasitoid beetle from the cells of the mud nests of Eumenid wasps in India.

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G. SRINIVASAN
K. SASIKALA
Department of Zoology
Bharathiar University
Coimbatore 641 046.
MOHANASUNDARAM
Professor of Entomology (Retd.)
T.N.A.U.
Coimbatore 641 003

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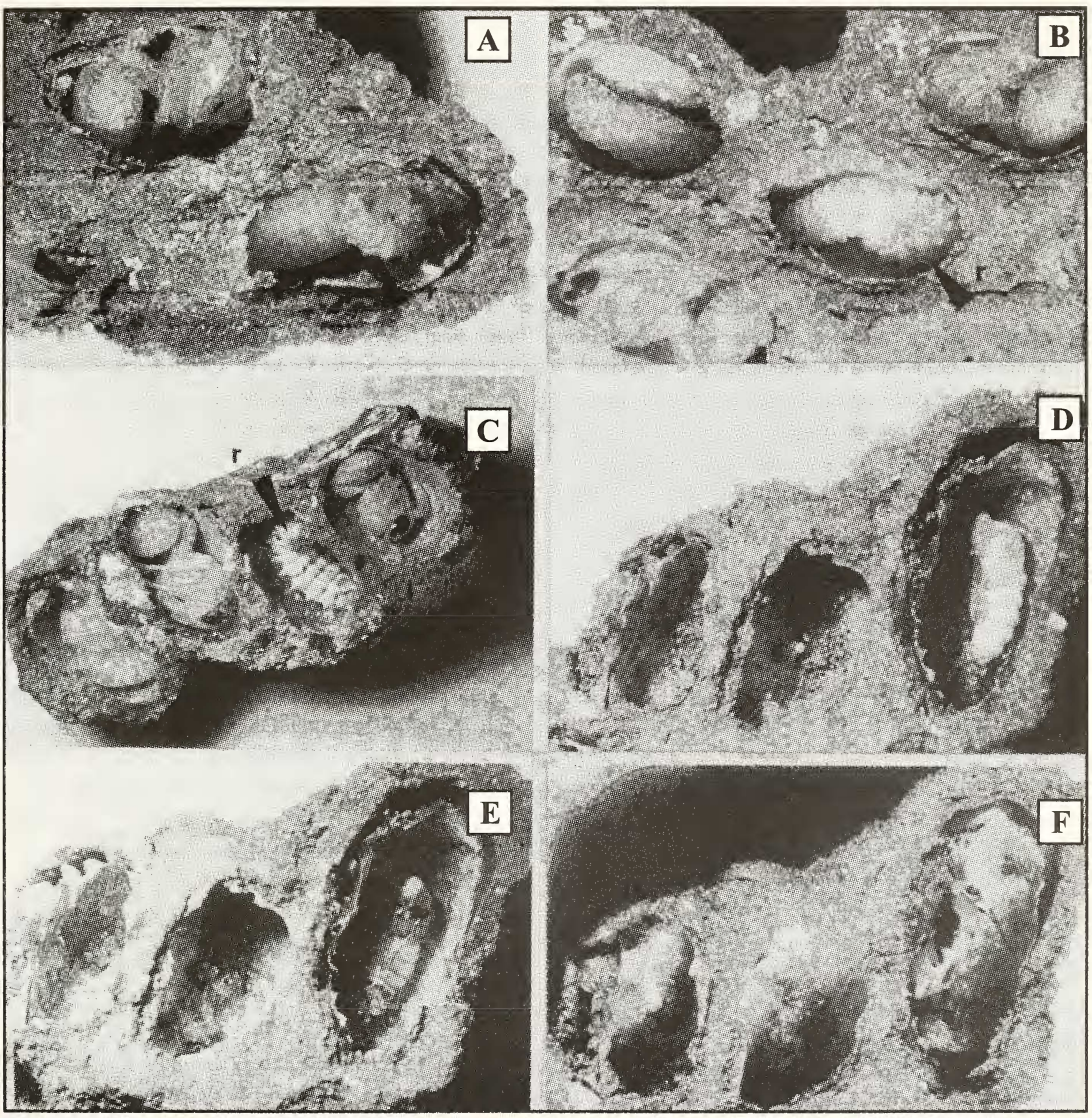
23. PREDATION BY ANTS ON FROGS AND INVERTEBRATES

On November 29, 1995, while we were walking along a perennial stream bed in Phansad Wildlife Sanctuary (Maharashtra), at around 10:30 in the morning, we noticed some army ants moving in columns along the ground. There was forest on either side of the stream. The ants were about a centimetre in length and made a buzzing sound when we blew on the densely packed columns. Though we were unable to identify these ants, from the descriptions given by Lefroy

Srinivasan, G. *et al.*: Rhipiphorid parasite beetle PLATE 1



A & B: Spiny Rhipiphorid grub feeding on Eumenid grub, r - Rhipiphorid grub, C. last instar Rhipiphorid grub within cell after completely feeding Eumenid grub, D. just pupating Rhipiphorid, E. Pupa of Rhipiphorid, F. just emerged Rhipiphorid beetle

(1984), Shivashankar and Veeresh (1987) and Hölldobler and Wilson (1990) we presume they were army ants belonging to the genus *Leptogenys* of the subfamily Ponerinae which inhabits tropical and subtropical regions.

The ants were moving in separate columns in the drier part of the stream bed, and no two columns merged though they were passing only a centimetre away. The whole column would stop, stand still and then change direction, each and every ant in the column turning at the same time. This clearly showed that communication among the ants was very well coordinated.

While the ants were moving around, one of the columns moved towards a hole at the base of a small boulder in the stream bed. The ants in the column then arranged themselves around the hole in a semicircle (10 to 15 cm radius). The entire semicircle was filled up by ants. Most of them stood still, while some near the mouth of the hole went in and attacked the frogs, which were resting inside (holes being moist).

The frogs *(Philautus* sp., *Euphlyctis cyanophlyctis* and *Limnonectes limnocharis)* jumped out and fell amidst the waiting ants. Within seconds, the ants in the semicircle overpowered the struggling frogs, which were completely covered by the ants. The ants started biting off flesh from the live frogs and ripped their bodies open. Within thirty minutes only the skeletons of the frogs were left. Some ants from this column then proceeded to another hole and carried out the same operation. Two to three columns were operating simultaneously on the stream bed. One of the columns also consumed a Mygalomorph spider (species unidentified). A crab, which emerged out of a burrow, remained quite unaffected by the attacking ants.

Yet another column climbed a Kadamb tree *(Anthocephalus indica = kadamba = chinensis)* and as the ants moved up, they broke off the termite sheeting on the trunk and preyed on the termites. The entire episode was like a well organised army operation. The common name army ants is derived from this behaviour. As soon as an ant got its prey, it turned around and started descending while the ant behind came forward and replaced it. The column went up the tree trunk to a height of around 2.5-3 m and then turned back and started descending. While they were descending, we placed a twig with 20 to 30 *Cremastogaster* ants (species unidentified) among one of the driver ant columns, expecting them to attack and devour the *Cremastogaster* ants which were much smaller (about one fourth the size of driver ants). Surprisingly. the driver ants avoided these *Cremastogaster* ants by clearing off a circular area around the twig.

We watched the entire activity of the driver ants for around two hours, after which they left the stream bed and started moving into the forest. As soon as they went in we could see grasshoppers, frogs, crickets and other invertebrates jump and try to move out of their way. Certain species of birds from South America are known to follow columns of army ants and feed on the insects flushed out by them (Willis and Oniki 1978). Though we saw many insects being flushed out by the ants we did not see any bird following the ant columns.

We have visited Phansad Sanctuary on many occasions but never seen such an event again. The proficiency with which the ants went about their work was truly impressive.

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SHOMEN MUKHERJEE
Wildlife Institute of India,
Post Box #18, Chandrabani,
Dehra Dun 248001.
VIVEK GOUR BROOME
J.E.Fanns, Marunji,
Pune 411027.

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24. MASS FEEDING OF BARONET BUTTERFLY *SYMPHAEDRA NAIS* FOSTE.. ON HONEY DEW DROPS

In the month of November we observed several individuals of *Symphaedra nais* feeding on the secretion fallen on the ground from the silk cotton tree (*Bombax ceiba*). The secretion appeared like oil drops sprinkled on the ground and the butterflies were rubbing their proboscis on it. On subsequent visits, the same phenomenon was observed under a *Bridelia retusa* tree overhanging the roof of a building. The secretion had fallen from the branches growing over the roof.

On taking a closer look, we observed that the leaves of *Bridelia* were heavily infested with various stages of nymphs and adult insects. The insects were collected and subsequently identified as *Tenaphalara acutipennis* Kuwayama, Family Psyllidae. They are known to feed on young shoots and leaves of *Bombax ceiba.* The nymphs exude a copious amount of honey dew and also produce a waxy secretion. Usually, 4 to 5 butterflies were seen feeding, with a maximum number upto 10 at a time. The number of individuals visiting the site was greater in the morning, and the activity continued till late noon.

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September 22, 1998 NARESH CHATURVEDI
V. SHUBHALAXMI
Bombay Natural History Society,
Hornbill House, S.B. Singh Road,
Mumbai 400 023.

25. POLYMORPHISM IN THE IMMATURE STAGES OF *OTHREIS FULLONIA* CLERCK

(*With two plates*)

Seasonal colour variation in adult Lepidoptera is a known fact. It has also been recorded that early instars of a few hawk moths show seasonal colour variation (Sevastopulo, 1940).

During a survey of the lepidopteran fauna of Sanjay Gandhi National Park (SGNP), Mumbai, I made some remarkable observations on the genus *Othreis*. The genus is well represented in SGNP. *Othreis fullonia,* commonly called the Orange Underwing, is also well represented in this area. The adult of the species has been described by Hampson (1894), Barlow (1981) and its early stages by Sevastopulo (1940). However, there is no mention of its life cycle and colour variation in different seasons. Hence, a study of the life cycle of *Othreis fullonia* was undertaken. The data was collected over a period of two years from July 1995 to December 1997.

The early instars are common during the peak monsoon period and feed exclusively on *Cocculus hirsutus,* commonly called as Vasan Vel. The early instars were collected from the study site and reared at home in rearing tanks. Detailed observations were made, which are described later. A total of 173 larvae were reared during the study period.